ATCA–S100

Reference Guide

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Contents

Using This Guide

Other Sources of Information

Safety Notes

Sicherheitshinweise

1 Introduction

Features 21

Standard Compliances 22

Ordering Information 23

Product Nomenclature 23

Order Numbers 23

Feedback 25

2 Installation

Introduction 27

Before Installation 28

Requirements 28

Environmental Requirements 28

Power Requirements 32

Required Equipment 33

Unpacking and Inspecting the Blade 33

Blade Installation and Power–Up 34

Installation in a Powered Shelf 34

Installation in a Non–Powered Shelf 36

Operation 37

Enabling/Disabling SFPs 37

Fiber Channel Speed 38

3 Functional Description

Introduction 40

Function Blocks 41
Hard Disks 42
IPMC Storage Blade Management 42
Power Supply 42
Fiber Channel Connections 42
Temperature Sensors 43

4 Controls, Indicators, and Connectors

Face Plate 45
LEDs 46
FC Connectors 46

Backplane Connectors 47
Zone 2 Connectors 47
Power Connector 48

Sensors 49

Index

Tables

Introduction

Table 1 Standard Compliances 22
Table 2 Product Nomenclature ATCA−S100/xxx−y 23
Table 3 Ordering Information Excerpt 23
Table 4 Additional Ordering Information 24

Installation

Table 5 Environmental Requirements 28
Table 6 DC System Power Requirements 32
Table 7 Motorola OEM IPMI Commands − Parameters 37
Table 8 Motorola OEM IPMI Commands − Request and Response Data Format 37

Controls, Indicators, and Connectors

Table 9 Description of Face Plate LEDs 46
Table 10 P23 Connector Pinouts 47
Table 11 ATCA−S100 Specific Sensors 49

Figures

Installation

Figure 1 Top Side of the Blade 30
Figure 2 Bottom Side of the Hard Disk 31
Figure 3 Top Side of the Hard Disk 31

Functional Description

Figure 4 Function Blocks of ATCA–S100 41
Figure 5 Fiber Channel Connections 43

Controls, Indicators, and Connectors

Figure 6 Face Plate 45

Using This Guide

This manual is intended for users qualified in electronics or electrical engineering. Users must have a working understanding of AdvancedTCA and telecommunications.

Conventions

Notation	Description
57	All numbers are decimal numbers except when used with the notations described below.
Bold	Used to emphasize a word
Note:	No danger encountered. Pay attention to important information
Caution	Possibly dangerous situation: slight injuries to people or damage to objects possible

Abbreviations

Abbreviation	Description
A	
AdvancedTCA	Advanced Telecommunications Computing Architecture
ATCA	Advanced Telecommunications Computing Architecture
B	
BIB	Board Information Block
C	
CGL	Carrier Grade Linux
CMD	Command Code
CO	Central Office
D	
DC	Direct Current
E	
EEPROM	Electrically Erasable Programmable Read-Only Memory

Abbreviation	Description
EMC	Electromagnetic Compatibility
EMV	Elektromagnetische Vertraeglichkeit
EN	European Norm
ESD	Electrostatic Sensitive Device
F	
FC	Fibre Channel
FCC	Federal Communications Commission
FRU	Field Replacable Unit
G	
GmbH	Gesellschaft mit beschraenkter Haftung
H	
H/S	Hot-Swap
HA	High Availability
HAF	High Availability Framework
HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive
I	
ID	Identifier
IEC	International Electric Code
IMC	IPM Master Controller
IPM	Intelligent Platform Management
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
ISC	IPM Slave Controller
L	
LED	Light Emitting Diode
LUN	Logical Unit Number
M	
MD	Multiple Device
N	
NEBS	Network Equipment Building System
NetFn	Network Function Code
NFS	Network File System
O	
OEM	Original Equipment Manufacturer

Abbreviation	Description
OOS	Out-Of-Service
P	
PBC	Port Bypass Circuit
PEM	Power Entry Module
PICMG	PCI Industrial Computer Manufacturers Group
PMC	PCI Mezzanine Card
PMC	Periperal Management Controller
R	
RAID	Redundant Array of Inexpensive Disks
S	
S.M.A.R.T.	Software Maintenance and Reference Tool
SCSI	Small Computer System Interface
SDR	Sensor Data Record
SELV	Safety Extra Low Voltages
SFP	Small Form-Factor Pluggable
ShM	Shelf Manager
ShMC	Shelf Management Controller
STB	Storage Blade
T	
TNV	Telecommunication Network Voltage
TNV-2	Telecom Network Voltages without overvoltage
U	
UL	Underwriters Laboratory Inc.
V	
VCCI	Voluntary Control Council for Interference

Revision History

Order No.	Rev.	Date	Description
221746	AA	October 2003	Preliminary Installation Guide Initial Version
	AB	December 2003	Changed product name from ATCA FC Storage Blade to ATCA–S100; Changed Function Blocks figure; Added standard compliances; Added ordering information; Added environmental requirements; Changed power requirements; Due to PBC routing instead of multiplexer routing and changed routing destinations: Changed figures in Storage Systems Chapter, Changes in Board Installation, Changes in Zone 2 Connectors. Due to IPMC changes: Changed switch settings and deleted first step in installation procedure in Blade Installation; Due to changed face plate: Note deleted in LEDs; Editorial changes
		February 2004	Changed Ordering Information, Changed figure of Fibre Channel Connections, Changed power requirements.
	AC	May 2004	Added storage blade management. Changed backplane connectors.
	AD	August 2004	Added functional description. Completion of the installation chapter.
	AE	September 2004	Updated safety Information and sensor information
	AF	December 2004	Updated safety information, figures (overview and face plate) and requirements.
	AG	December 2004	Updated safety information, requirements and inserted temperature dependencies.
	AH	January 2005	Updated temperature dependencies.
	AI	February 2005	Updated safety notes and temperature dependencies.
226058	AA	April 2005	Changed logo, copyright, ... from Force Computers to Motorola
	AB	May 2005	Added operating voltage for US and Canada. Changed section ″Feedback″.
228597	AA	April 2006	Deleted all information on support of fibre channel via backplane Updated ordering information

Other Sources of Information

Check the former Force Computers S.M.A.R.T server (http://splus.forcecomputers.com/) or the Motorola literature catalog for errata sheets that may be applicable to the blade For further information refer to:

Company	Internet Address	Document
Motorola	www.splus.forcecomputers.com or www.motorola.com/computer/literature	Centellis CO 31kX System Installation Guide Centellis CO 31kX System Description ATCA-M100 Installation Guide AdvancedTCA Shelf Management Interface Reference Guide ATCA-S100: Control via IPMI Reference Guide ACC/ATCA-S100 Installation Guide
PICMG	picmg.org	PICMG 3.0 R 1.0, December 30, 2002 PICMG 3.1 R 1.0, January 22, 2003

Safety Notes

This section provides safety precautions to follow when installing, operating, and maintaining the product.

We intend to provide all necessary information to install and handle the product in this manual. However, as the product is complex and its usage manifold, we do not guarantee that the given information is complete. If you need additional information, ask your Motorola representative.

The product has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by Motorola or persons qualified in electronics or electrical engineering are authorized to install, remove or maintain the product. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.

EMC

The blade has been tested in a Standard Motorola system and found to comply with the limits for a Class A digital device in this system, pursuant to part 15 of the FCC Rules respectively EN 55022 Class A. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial environment.

The blade generates and uses radio frequency energy and, if not installed properly and used in accordance with this Reference Guide, may cause harmful interference to radio communications. Operating the system in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

To ensure proper EMC shielding, always operate the blade with the PMC card installed. If blades are integrated into open systems, always cover empty slots.

To ensure proper EMC shielding, always operate the blade with the filler blades or with PMC module installed. If blades are integrated into open systems, always cover empty slots.

Blade Installation

Observe the following general safety note when installing the blade into your system:

- **Restricted access area – The system is only to be installed in a restricted access area.**

Electrostatic discharge and incorrect blade installation and removal can damage circuits or shorten their life. Therefore:

- **Touching the blade or electronic components in a non-ESD protected environment causes component and blade damage. Before touching blade or electronic components, make sure that you are working in an ESD-safe environment.**
- **When plugging the blade in or removing it, do not press or pull on the face plate but use the handles.**
- **Before installing or removing an additional device or module, read the respective documentation.**
- **If the blade is delivered as part of a system, do not change the cabling of the blade unless it is explicitly stated in the system's documentation.**

Installation

Data loss
Removing the blade with the blue LED still blinking causes data loss.
Wait until the blue LED is permanently illuminated, before removing the blade.

Damage of Circuits
Electrostatic discharge and incorrect blade installation and removal can damage circuits or shorten their life.
Before touching the blade or electronic components, make sure that you are working in an ESD-safe environment.

Blade Malfunctioning
Incorrect blade installation and removal can result in blade malfunctioning.
Make sure that the blade is connected to the system backplane via all assembled connectors and that power is available on all zone 1 power pins.

Blade Malfunctioning
Incorrect blade installation and removal can result in blade malfunctioning.
When plugging the blade in or removing it, do not press on the face plate but use the handles.

Operation

Blade damage
Blade surface
High humidity and condensation on the blade surface causes short circuits.
Do not operate the blade outside the specified environmental limits. Make sure the blade is completely dry and there is no moisture on any surface before applying power.
Do not operate the blade below 0°C.

Blade Overheating and Blade Damage
Operating the blade without forced air cooling may lead to blade overheating and thus blade damage.
When operating the blade, make sure that forced air cooling is available in the shelf.

Injuries or short circuits
Blade or power supply
In case the ORing diodes of the blade fail, the blade may trigger a short circuit between input line A and input line B so that line A remains powered even if it is disconnected from the power supply circuit (and vice versa).
To avoid damage or injuries, always check that there is no more voltage on the line that has been disconnected before continuing your work.

Hot Swap

Installing the blade into or removing it from a powered system not supporting hot swap or high availability causes blade damage and data loss. Therefore, only install it in or remove it from a powered system if the system itself supports hot swap or high availability and if the system documentation explicitly includes guidelines.

Removing the blade from the backplane while the hot–swap LED is still off causes data loss. Therefore, wait until the blue hot–swap LED is on before removing the blade.

Replacement/Expansion

Only replace or expand components or system parts with those recommended by Motorola. Otherwise, you are fully responsible for the impact on EMC or any possible malfunction of the product.

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).

Replacement/Expansion

Only replace or expand components or system parts with those recommended by Motorola. Otherwise, you are fully responsible for the impact on EMC or any possible malfunction of the product.

As the blade is current protected, an overcurrent results in a power–down of the blade if an overcurrent occurs. Make sure that the max. power consumption per PMC slot at +/–12V, 5V and 3.3V level does not exceed 7.5W (total overall used voltages).

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).

Laser

Some variants of the blade are a Class I laser product. The use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Environment

Always dispose of used batteries and/or old blades according to your country's legislation, if possible in an environmentally acceptable way.

Sicherheitshinweise

Dieser Abschnitt enthält Sicherheitshinweise, die bei Einbau, Betrieb und Wartung des Blades zu beachten sind.

Wir sind darauf bedacht, alle notwendigen Informationen, die für die Installation und den Betrieb erforderlich sind, in diesem Handbuch bereit zu stellen. Da es sich jedoch bei dem Board um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Sie weitere Informationen benötigen sollten, wenden Sie sich bitte an die für Sie zuständige Geschäftsstelle von Motorola.

Das Blade erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschliesslich für Anwendungen in der Telekommunikationsindustrie und im Zusammenhang mit Industriesteuerungen verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Motorola ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschliesslich dazu, das Wissen von Fachpersonal zu ergänzen, können es aber in keinem Fall ersetzen.

EMV

Das Blade wurde in einem Motorola Standardsystem getestet. Es erfüllt die für digitale Geräte der Klasse A gültigen Grenzwerte in einem solchen System gemäß den FCC–Richtlinien Abschnitt 15 bzw. EN 55022 Klasse A. Diese Grenzwerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Blades in Gewerbe– sowie Industriegebieten gewährleisten.

Das Blade arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten.

Warnung! Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

Wenn Sie das Blade in Systeme einbauen, schirmen Sie freie Steckplätze mit einer Blende ab.

Blade Installation

Bevor Sie die Blade in einem System installieren, überprüfen Sie, ob die im Kapitel ″Installation″ aufgeführten Anforderungen erfüllt werden.

Beachten Sie folgenden allgemeinen Sicherheitshinweis bei der Installation der Blade:

- **Bereich mit eingeschränktem Zugang – Installieren Sie die Blade in ein System nur in Bereichen mit eingeschränktem Zugang.**

Installation

Elektrostatische Entladung und unsachgemäßer Ein– und Ausbau des Blades kann Schaltkreise beschädigen oder ihre Lebensdauer verkürzen. Beachten Sie deshalb die folgenden Punkte:

- **Berühren Sie das Blade oder elektrische Komponenten in einem nicht ESD–geschützten Bereich, kann dies zu einer Beschädigung des Blades führen. Bevor Sie Boards oder elektronische Komponenten berühren, vergewissern Sie sich, dass Sie in einem ESD–geschützten Bereich arbeiten.**
- **Drücken Sie beim Ein– oder Ausbau des Blades nicht auf die Frontplatte, sondern benutzen Sie die Griffe.**
- **Lesen Sie vor dem Ein– oder Ausbau von zusätzlichen Geräten oder Modulen das dazugehörige Benutzerhandbuch.**
- **Falls das Blade als Teil eines Systems ausgeliefert wird, tauschen Sie keine Verkabelungen des Blades aus, es sei denn, es ist in der Systemdokumentation ausdrücklich erwähnt.**

Betrieb

Beschädigung des Blades
Hohe Luftfeuchtigkeit und Kondensat auf der Oberfläche des Blades können zu Kurzschlüssen führen.
Betreiben Sie das Blade nur innerhalb der angegebenen Grenzwerte für die relative Luftfeuchtigkeit und Temperatur. Stellen Sie vor dem Einschalten des Stroms sicher, dass sich auf dem Blade kein Kondensat befindet und betreiben Sie das Blade nicht unter 0˚C.

Überhitzung und Beschädigung des Blades
Betreiben Sie das Blade ohne Zwangsbelüftung, kann das Blade überhitzt und schließlich beschädigt werden.
Bevor Sie das Blade betreiben, müssen Sie sicher stellen, dass das Shelf über eine Zwangskühlung verfügt.

Verletzungen oder Kurzschlüsse
Blade oder Stromversorgung
Falls die ORing Dioden des Blades durchbrennen, kann das Blade einen Kurzschluss zwischen den Eingangsleitungen A und B verursachen. In diesem Fall ist Leitung A immer noch unter Spannung, auch wenn sie vom Versorgungskreislauf getrennt ist (und umgekehrt).
Prüfen Sie deshalb immer, ob die Leitung spannungsfrei ist, bevor Sie Ihre Arbeit fortsetzen, um Schäden oder Verletzungen zu vermeiden.

Hot Swap

Wenn Sie das Blade im laufenden Betrieb in ein System, das weder Hot Swap noch High Availability unterstützt, installieren bzw. herausziehen, wird das Blade beschädigt und es gehen Daten verloren. Installieren/entfernen Sie das Blade nur im laufenden Betrieb, wenn das System Hot Swap oder High–Availability unterstützt und wenn die Systembeschreibung dies ausdrücklich erlaubt.

Ziehen Sie das Blade im laufenden Betrieb heraus, obwohl die Hot–Swap LED noch nicht leuchtet, führt das zu Datenverlust. Warten Sie deshalb bis die Hot–Swap LED blau leuchtet, bevor Sie das Blade herausziehen.

Austausch/Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von Motorola empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV oder Fehlfunktionen des Produktes voll verantwortlich.

Überprüfen Sie die gesamte aufgenomme Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass die Stromaufnahme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegt (siehe die technischen Daten des entsprechenden Verbrauchers).

Austausch/Erweiterung

Verwenden Sie bei Austausch oder Erweiterung nur von Motorola empfohlene Komponenten und Systemteile. Andernfalls sind Sie für mögliche Auswirkungen auf EMV oder Fehlfunktionen des Produktes voll verantwortlich.

Das Blade ist gegen Überstrom gesichert und schaltet bei einem Überstrom ab. Stellen Sie sicher, dass der Gesamtstromverbrauch pro PMC Modul bei +/– 12V, 5V und 3,3V 7,5W nicht übersteigt (Summe aller Spannungen).

Überprüfen Sie die gesamte aufgenomme Leistung aller eingebauten Komponenten (siehe die technischen Daten der entsprechenden Komponente). Stellen Sie sicher, dass

die Stromaufnahme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegt (siehe die technischen Daten des entsprechenden Verbrauchers).

Laser

Einige Varianten des Produktes sind Laserprodukte der Klasse I. Um nicht schädlicher Laserstrahlung ausgesetzt zu werden, beachten Sie die folgenden Hinweise: Anpassungen am Produkt, die Bedienung von Steuerelementen sowie die Durchführung von Prozeduren dürfen nur gemäß den Anweisungen in diesem Dokumnent erfolgen.

Umweltschutz

Entsorgen Sie alte Batterien und/oder Blades stets gemäß der in Ihrem Land gültigen Gesetzgebung, wenn möglich immer umweltfreundlich.

1

Introduction

Features **21**

Standard Compliances **22**

Ordering Information **23**

Product Nomenclature 23

Order Numbers 23

Feedback **25**

Features

ATCA-S100 is an Advanced Telecom Computing Architecture (AdvancedTCA) PICMG 3.0 and PICMG 3.1 compliant single-slot mass storage module with up to 300 GByte Hard Disk Drive (HDD) storage capacity. It is designed for use in systems which meet the AdvancedTCA specification.

Important features are:

- Two 3.5-inch Fibre Channel (FC) HDDs for on-board storage
- Face plate connection via Small Form Pluggable (SFP) connectors enables mass storage expansion
- Redundant FC connectivity available on face plate provides scalable blade architectures
- 1 or 2 Gbit/s FC interfaces
- Supports FC switch architectures as well as direct Host Bus Adapter (HBA)
- Hardware Management by AdvancedTCA compliant Intelligent Platform Management Interface Controller (IPM Controller/IPMC)
- Hot-swappable ATCA-S100 blade ensures serviceability and system availability

The ATCA-S100 storage blade is built for face plate connection and has a wide field of application. A sophisticated application is a High Availability (HA) storage solution which includes the necessary software components to use the blades in a redundant configuration so that if one blade is removed no data will be lost to the system.

Standard Compliances

ATCA–S100 meets the following standards:

Table 1: *Standard Compliances*

Standard	Description
UL 60950–1, EN 60950–1, IEC 60950–1 CAN/CSA C22.2 No 60950–1	Legal safety requirements
EN 55022 EN 55024 EN 300386 FCC Part 15	EMC requirements on system level (predefined Motorola system)
ANSI/IPC–A610 Rev.C Class 2 ANSI/IPC–7711 ANSI/IPC–7721 ANSI–J–001...003	Manufacturing requirements
NEBS Standard GR – 63 – CORE NEBS Standard GR – 1089 CORE	NEBS level three The product is designed to support NEBS level three. The compliance tests must be done with the customer target system.
PICMG 3.0 R1.0	Defines mechanics, blade dimensions, powr distribution, power and data connectors, and system management

Note:

- **Shock and vibration resilience will rely on the damping built into the HDDs.**
- **Thermal performance of the HDDs is carefully examined. Thermal range specifications of standard HDDs suggest that the 55˚C / 96 hour requirement may not be satisfied even by future products.**

Ordering Information

When ordering blade variants, upgrades, and accessories, use the order numbers given below.

Product Nomenclature

In the following you find the key for the product name extensions.

Table 2: *Product Nomenclature ATCA-S100/xxx-y*

Nomenclature Abbreviations	Description
xxx	HDD storage capacity in GByte
y	Number of HDDs

Order Numbers

The table below is an excerpt from the blade's ordering information. Ask your local Motorola representative for the current ordering information. The two accessory kits are provided seperately. They have to be installed by the operator.

Table 3: *Ordering Information Excerpt*

Order No.	Name	Description
122270	ATCA-S100/150-1/R2/31KX	PICMG 3.x fully compliant single-slot mass storage blade equipped with 1 HDD, 150GB each Total raw capacity: 150GB
122271	ATCA-S100/150-2/R2/31KX	PICMG 3.x fully compliant single-slot mass storage blade equipped with 2 HDDs, 150GB storage capacity Total raw capacity: 300 GB
123067	ATCA-S100/150-1/R2	PICMG 3.x fully compliant single-slot mass storage blade equipped with 1 HDD, 150GB storage capacity Total raw capacity: 150 GB
123068	ATCA-S100/150-2/R2	PICMG 3.x fully compliant single-slot mass storage blade equipped with 2 HDDs, 150GB storage capacity Total raw capacity: 300 GB
121272	ACC/ATCA-S100-F	Two SFP transceivers together with fibre cables and connectors
121582	ACC/ATCA-S100-C	Two SFP transceivers together with copper cables and connectors

In the following table you find information about recommended cables and transceivers.

Table 4: *Additional Ordering Information*

Web Adress	Description
www.tyco.com	Copper transceiver Tyco 1367251-1
www.tyco.com	Copper cable Tyco 1434120-6

Feedback

We welcome and appreciate your comments on our documentation. We want to know what you think about our manuals and how we can make them better.

Mail comments to:

- Motorola GmbH
  Embedded Communications Computing
  Lilienthalstraße 15
  85579 Neubiberg
  Germany
  Email: reader-comments@mcg.mot.com

In all your correspondence, please list your name, position, and company. Be sure to include the title, part number, and revision of the manual and tell how you used it.

2

Installation

Introduction **27**

Before Installation **28**

Requirements 28
- Environmental Requirements 28
- Power Requirements 32
- Required Equipment 33

Unpacking and Inspecting the Blade 33

Blade Installation and Power–Up **34**

Installation in a Powered Shelf 34

Installation in a Non–Powered Shelf 36

Operation **37**

Enabling/Disabling SFPs 37

Fiber Channel Speed 38

Introduction

This chapter describes how to install the ATCA–S100 storage blade and includes the following information:

- Before installation
- Installation of the blade in a shelf
- Starting up the blade
- Removing the blade
- Operation

Before Installation

This section provides the following information:

- Requirements
- Unpacking and inspecting the blade

Requirements

Standard operating system FC drivers to access the HBA are sufficient for running the storage blade.

Before you power up the blade, calculate the power needed according to your system configuration.

Environmental Requirements

The environmental values must be tested and proven in the used system configuration.

Note: Operating temperatures refer to the temperature of the air circulating around the blade and not to the component temperature.

Caution

Blade damage
Blade surface
High humidity and condensation on the blade surface causes short circuits.
Do not operate the blade outside the specified environmental limits. Make sure the blade is completely dry and there is no moisture on any surface before applying power.
Do not operate the blade below 0˚C.

Note: Please bear in mind that the requirements listed below may be further limited by the type of hard disk.

Table 5: *Environmental Requirements*

Feature	Operating	Non-Operating
Temperature	0˚C to +55˚C may be further limited by type of hard disk	-40˚C to +70˚C may be further limited by type of hard disk
Temp. change	+/- 0.25˚C/min	+/- 0.25˚C/min
Rel. humidity	5 to 95% (non-condensing)	5 to 95% (non-condensing)
Altitude	up to 3,000 m	up to 12,000 m

Feature	Operating	Non–Operating
Vibration 5–20 Hz 20–250 Hz	0.5 mm amplitude 0.5 g	1 mm amplitude 1.0 g
Shock	5g/11 ms half sine	15g/11 ms half sine
Free fall		1,200 mm/all edges and corners (packed state)

Temperature Limitations of the Blade

To guarantee proper blade operation you have to ensure that the temperatures of the following locations on the blade surface, the bottom and the top side of the hard disks are not exceeded:

The following figure shows the locations on the top side of the blade.

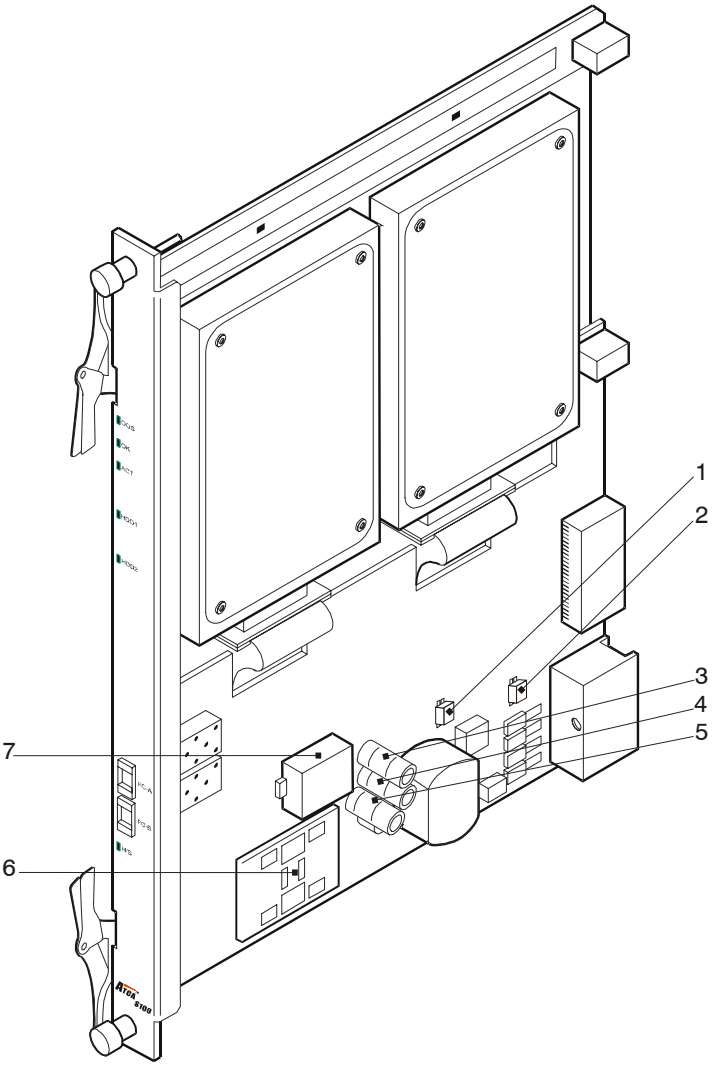


Figure 1: *Top Side of the Blade*

Location	Temperature
1	max. 95˚C
2	max. 95˚C
3	max. 100˚C
4	max. 100˚C
5	max. 100˚C
6	max. 100˚C
7	max. 90˚C

The following figures show the locations on the top and the bottom side of the hard disk.

Hard disk: Fujitsu MAP 3147 FC

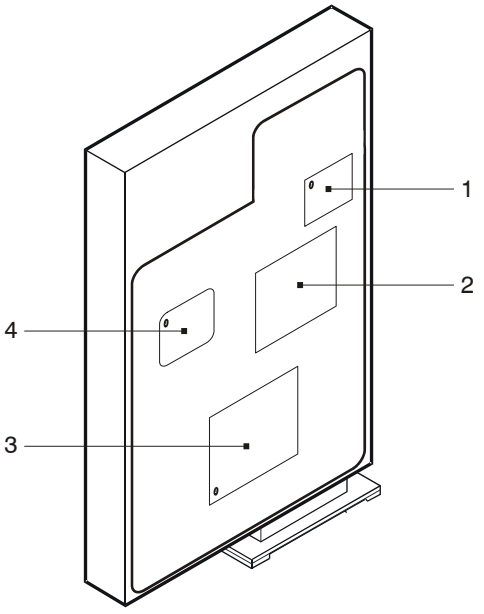


Figure 2: *Bottom Side of the Hard Disk*

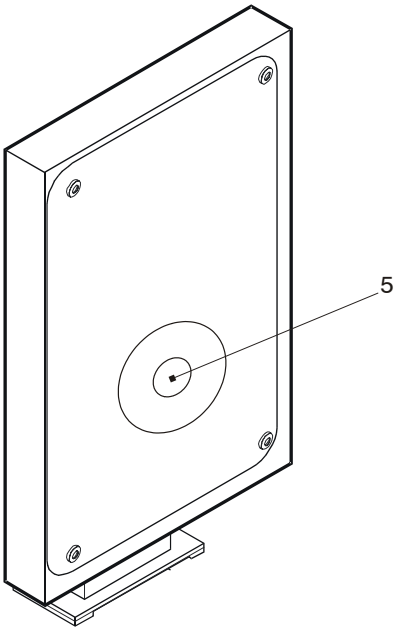


Figure 3: *Top Side of the Hard Disk*

Location	Temperature
1	max. 88˚C
2	max. 91˚C
3	max. 90˚C
4	max. 92˚C
5	max. 60˚C

Power Requirements

Make sure that the blade is used in an AdvancedTCA shelf connected to -48VDC up to -60VDC, according to Telecommunication Network Voltage (TNV-2).

The blade must be connected to a TNV-2 circuit. A TNV-2 circuit is a circuit whose normal operating voltages exceed the limits for a safety-extra-low-voltage (SELV) under normal operating conditions, and which is not subject to overvoltages from telecommunication networks.

On blade voltages are 12VDC, 5VDC, 3.3VDC, 2.5VDC and 3.3VDC IPM power:

- 12V voltage is generated from the –48V AdvancedTCA power by a quarter-brick 150W DC-DC converter with galvanic isolation suitable for TNV-2 circuits.. Power control is accomplished by the IPMC.
- 5V, 3.3V and 2.5V voltages are derived from the 12V power. It is available after powering the 12V by the IPMC.
- The IPM controller is supplied by the 3.3V Management Power. The IPM controller enables the 12V DC-DC converter via an isolated signal. The IPM power will only supply the IPMC, it is not connected to the 3.3 voltage of the blade.

Table 6: *DC System Power Requirements*

Feature	Value
Rated Voltage	-48VDC to -60VDC US and Canada: −48VDC
Operating Voltage	-40.5VDC to -72VDC US and Canada: −40.5 to −60VDC
Input current	1,25 A at 48V
Storage Blade Power Dissipation	60W up to 75W (max)

The blade provides two independent power inputs according to the AdvancedTCA specification. Each input has to be equipped with an additional fuse of max. 90A located either in the shelf where the blade is installed or the power entry module (PEM).

Required Equipment

Gather the following equipment before starting:

- Screwdriver
- ESD wrist strap

Unpacking and Inspecting the Blade

Caution **Before touching blades or electronic components, make sure that you are working in an ESD-safe environment.**

To inspect the shipment, perform the following steps.

Shipment Inspection

1. Verify that you have received all items of your shipment:
   Printed Safety Notes and Documentation CD-ROM or printed user manual
   ATCA-S100 blade
   Any optional items ordered
2. Check for damage and report any damage or differences to the customer service.

Note: The blade is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, please contact our customer's service immediately.

Blade Installation and Power–Up

This section describes how to install the blade in a powered and a non–powered shelf.

Caution

- **Damage of Circuits**
  Electrostatic discharge and incorrect board installation and removal can damage circuits or shorten their life.
  Before touching boards or electronic components, make sure that you are working in an ESD–safe environment.

- **Blade Malfunctioning**
  Incorrect blade installation and removal can result in blade malfunctioning.
  When plugging the blade in or removing it, do not press on the face plate but use the handles.

The storage blade will be installed in an AdvancedTCA node slot.

Installation in a Powered Shelf

Installation

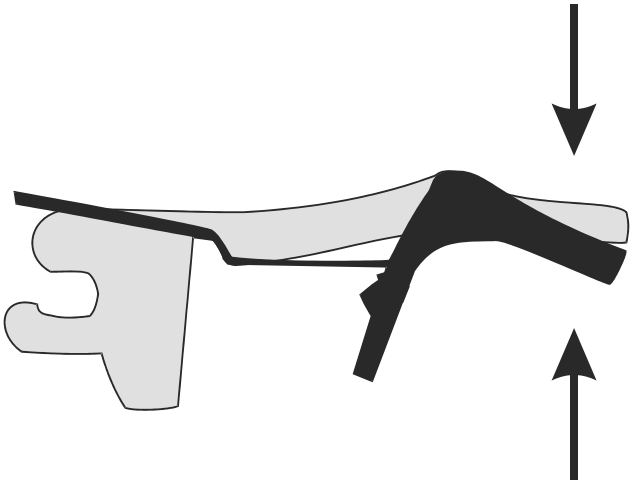
1. Ensure that the top and bottom ejector handles are in the outward position.
2. Insert blade into the shelf by placing the top and bottom edges of the blade in the card guides of the shelf. Ensure that the guiding module of shelf and blade are aligned properly.
3. Slide the blade into the shelf until you feel resistance.
4. Hook the lower and the upper handle into the shelf rail recesses.

Caution

Blade Damage
The blade handles are mechanically sensitive components and can easily be destroyed when not used properly.
When taking the following step, it is absolutely necessary to press the upper (grey) and lower (black) part of the handles together. (see the figure below)

5. Fully insert the blade.
6. Connect the optical or copper cable to the face plate of the blade.
7. Lock it to the shelf by pressing the grey and black components of the lower and the upper handles together and turning the handles towards the face plate.

As soon as the blade is connected to the backplane power pins, the blue LED is illuminated.
When the blade is completely installed, the blue LED starts to blink. This indicates that the blade announces its presence to the shelf management controller.



8. Wait until the blue LED is switched OFF.
   The switched off blue LED indicates that the blade is active.
9. Tighten the face plate screws which secure the blade to the shelf.

Removal

1. Unfasten the screws of face plate until the blade is detached from shelf.
2. Open the lower and the upper handle by pressing the grey and black handle components together and turning the handles outward.
   The blue LED blinks indicating that the blade power-down process is on-going.
3. Wait until the blue LED is illuminated permanently.
4. Remove the optical or copper cables from the face plate of the blade.

Note: If the LED continues to blink, a possible reason may be that upper layer software rejects the blade extraction request.

Caution

Data Loss
Removing the blade with the blue LED still blinking causes data loss.
Wait until the blue LED is permanently illuminated, before removing the blade.

5. Remove the blade from the shelf.

Installation in a Non–Powered Shelf

Installation

1. Ensure that the top and bottom ejector handles are in the outward position.
2. Insert blade into the shelf by placing the top and bottom edges of the blade in the card guides of the shelf. Ensure that the guiding module of shelf and blade are aligned properly.
3. Slide the blade into the shelf until you feel resistance.
4. Hook the lower and upper handle into the shelf rail recessed.

Caution

Blade Damage
The blade handles are mechanically sensitive components and can easily be destroyed when not used properly.
When taking the following step, it is absolutely necessary to press the upper (grey) and lower (black) part of the handles together. (see the figure below)

5. Fully insert the blade and lock it to the shelf by pressing the grey and black components of the lower and upper handles together and turning the handles towards the face plate (see figure above).
6. Tighten the face plate screws which secure the blade to the shelf.
7. Connect cables to the face plate, if applicable.

Removal

1. Remove face plate cables, if applicable.
2. Unfasten the screws of the face plate until the blade is detached from the shelf.
3. Open the lower and the upper handle by pressing the grey and black handle components together and turning the handles outward.
4. Remove the blade from the shelf.

Operation

The following standard settings can be changed via Motorola-specific IPMI commands:

- Enabling/Disabling SFPs
- Fiber channel speed (HDD speed)

The Motorola-specific IPMI commands that you have to use to change these settings are called "Set Discrete Sensor Value" and are characterized by the standard IPMI parameters given in the following table.

Table 7: *Motorola OEM IPMI Commands - Parameters*

Parameter	Value
NetFn	0x30 (OEM)
CMD	0x01

The IPMI request and response data of these IPMI commands need to have the following format.

Table 8: *Motorola OEM IPMI Commands - Request and Response Data Format*

Data Type	Byte	Data Field
Request Data	1	Sensor number (0xFF = reserved)
	2:3	Set mask (LSByte first) This field specifies which of the 15 possible bit states are to be set Bit 0: 1 = state 0 is to be set ... Bit 14: 1 = state 14 is to be set
	4:5	Value (LSByte first) This field specifies the new state (ON/OFF) for each of the selected bit states Bit 0: 1= state 0 is set to ON Bit 0: 0 = state 0 is set to OFF
Response Data	1	Completion Code (IPMI)

Enabling/Disabling SFPs

The ATCA-S100 provides two discrete sensors that allow to disable/enable the two SFPs of the blade. Each sensor is assigned to one SFP. For details about sensor number, sensor name and the assigned SFP refer to the *ATCA-S100: Control via IPMI Preliminary Reference Guide*.

Fiber Channel Speed

The ATCA–S100 provides one discrete sensor that allow to set the speeds of the two on–board fiber channels. The sensor is assigned to both fiber channels. The sensor determines the same speed both fiber channels. Two different speeds are possible: low (1 GBit/s) and high (2 GBit/s).

Since the two ports of each on–board hard disk always run at the same speed, both fiber channels must be set to the same speed. The hard disk fiber channel interface speed automatically adapts to the selected fiber channel speed.

For details about sensor number, sensor name and the assigned SFP refer to the *ATCA–S100: Control via IPMI, Preliminary Reference Guide.*

3

Functional Description

Introduction **40**

Function Blocks **41**

Hard Disks 42

IPMC Storage Blade Management 42

Power Supply 42

Fiber Channel Connections 42

Temperature Sensors 43

Introduction

The storage blade is used as the mass storage module in an AdvancedTCA storage system. The storage blade can be plugged into an AdvancedTCA dual star or dual–dual star backplane.

Generally, an AdvancedTCA storage system consists of two major components:

- Storage controller with Fiber Channel Host Bus Adapters (FC HBA).
- One or more storage blades

To achieve a fully redundant configuration a second storage controller with two fiber channel host bus adapters and redundant storage blade can be used.

Storage controller (HBA) and storage blade can be connected via the face plate using optical or copper SFP transceivers and cables.

Native fibre channel protocol is used between all building blocks.

Function Blocks

The figure shows the major function blocks of ATCA–S100:

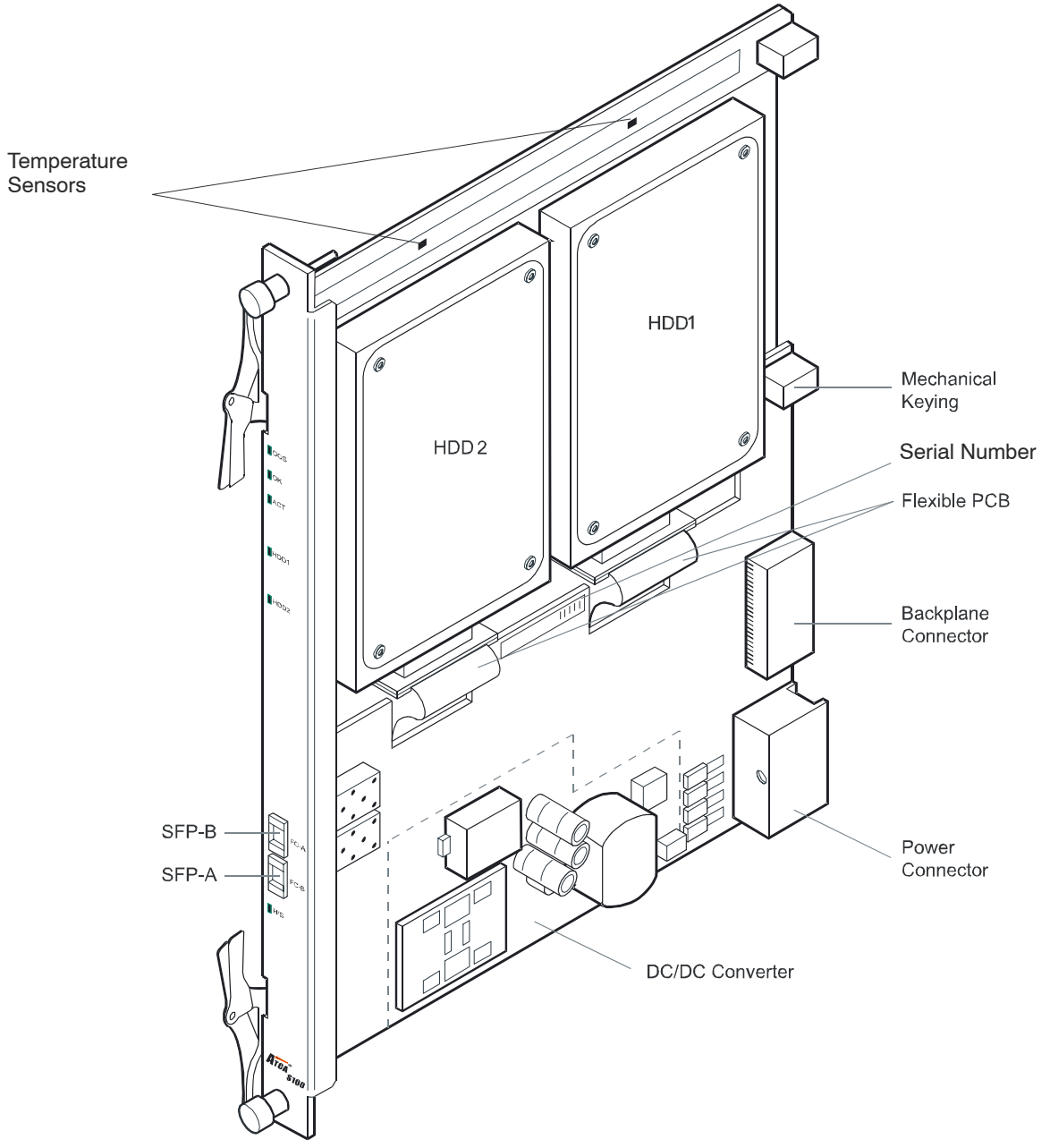


Figure 4: *Function Blocks of ATCA–S100*

The major function blocks are described in the following sections.

Hard Disks

Two standard low profile 3.5–inch FC hard disks are used on the storage blade. Both FC ports of each disk are connected. For each port of each disk a Port Bypass Circuit (PBC) is provided. If an FC–port is defective, or if no disk is installed, the inoperative FC ports are bypassed. This closes the FC loop, keeping other devices within the loop accessible.

IPMC Storage Blade Management

The storage blade management is based on the Motorola building block Dual Atmega IPMC, consisting of a master controller and a slave controller. The master controller handles all IPMC functions in compliance with PICMG 3.0, using the functions implemented in the slave controller. The IPMC monitors on blade status signals and can power up the blade when authorized by the Shelf Management Controller (ShMC) via the Intelligent Platform Management Interface (IPMI).

The IPMC is powered by a dedicated 3.3V source converted from the –48V input.

The IPMI storage management provides:

- Power up control
- Displaying status by LEDs
- Monitoring hot swap
- Temperature sensors
- E–keying

The storage blade will only power up when all local conditions such as correctly inserted, handles closed, power within specification etc. are fulfilled, and the ShM has issued an IPMI command via the IPMB0 bus for the blade to power up.

Power Supply

Power supply is fully compliant with PICMG 3.0. The bus voltage 12V is directly used to power the hard disks. Secondary voltages 5V, 3.3V, 2.5V are derived from the bus voltage.

The IPMC is supplied by the IPM power (3.3V). A converter (–48V to 3.3V) supplies the IPM power.

Fiber Channel Connections

The following figure shows the storage blade ATCA–S100 fiber channel connections.

Fiber channels A and B are routed in a ring structure.

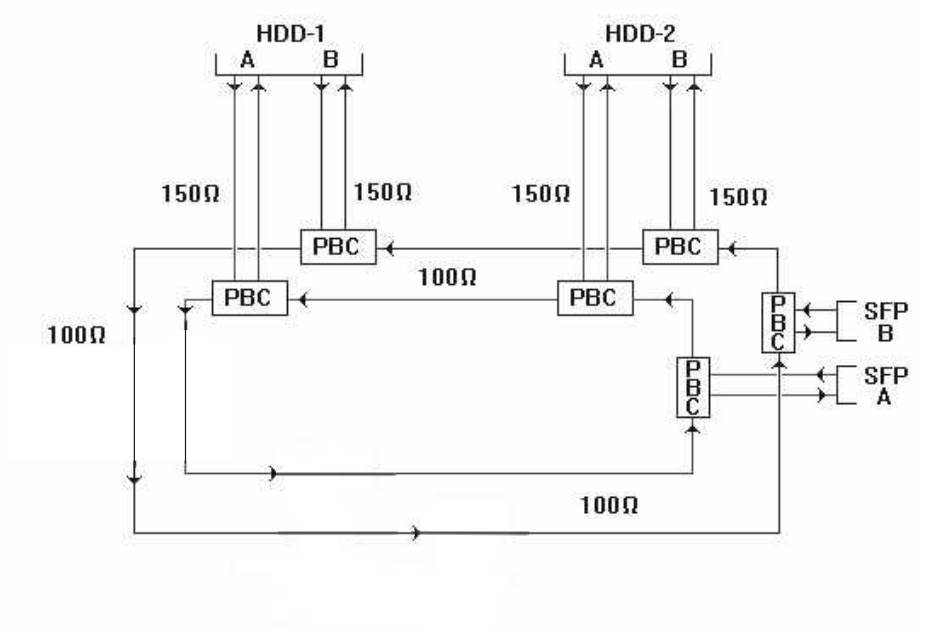


Figure 5: *Fiber Channel Connections*

Differential impedance of PBC–PBC connections is 100Ω and that of PBC–HDD connections is 150Ω.

To support electronic keying the backplane interfaces may be disabled by the IPMC.

Temperature Sensors

The ATCA–S100 provides two temperature sensors whose purpose is to measure the temperature of the two on–board hard disks. The sensor with the sensor ID 0x00 at LUN 1 measures the temperature of the hard disk HDD2 and the sensor with the sensor ID 0x01 at LUN 1 measures the temperature of HDD1. For further details about these sensors refer to the *ATCA–S100: Control via IPMI Refernce Guide*.

4

Controls, Indicators, and Connectors

Face Plate 45
LEDs 46
FC Connectors 46

Backplane Connectors 47
Zone 2 Connectors 47
Power Connector 48

Sensors 49

Face Plate

The following figure highlights the position of connectors, and LEDs on the face plate of the ATCA–S100 storage blade.

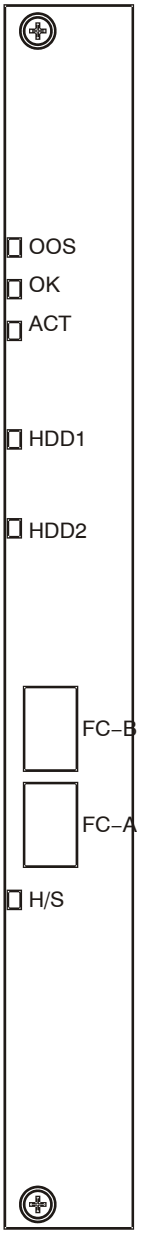


Figure 6: *Face Plate*

LEDs

The following LEDs can be found on the face plate of the blade.

Table 9: *Description of Face Plate LEDs*

LED	Description
LED0 (H/S)	Blue LED Hot-swap (H/S) indicator which supports the functionality of the PICMG 3.0 blue LED specification
LED1 (OOS)	Out-Of-Service (OOS) indicator Red: Power failure, HDD failure or FC unlocked OFF: Otherwise
LED2 (OK)	Green: The blade is powered and managed by the IPMC OFF: Otherwise
LED3 (ACT)	Amber: In a redundant configuration, one of the storage blades is active while the other one is standby OFF: Otherwise
HDD Activity (HDD1 and HDD2)	These two LEDs (one for each HDD) show the HDD activity Green: HDD is active

FC Connectors

Two SFP compatible host board connectors for transceiver modules are mounted on the blade to implement direct access to the HDDs.

For a detailed description please refer to the *ACC/ATCA-S100 Reference Guide*.

Backplane Connectors

ATCA–S100 is built for connection face plate. This section describes the backplane connectors.

Zone 2 Connectors

Zone 2 of the backplane provides the two connectors P22 and P23. Except for some pins, the connector pinouts are as specified in the AdvancedTCA P23 and P22 specification. The following table shows which pins are reserved.

Table 10: *P23 Connector Pinouts*

HBA FC Port	Channel	Port	Pinout	Signal Name
FC–A	1	3	P23.3e	Reserved
			P23.3f	Reserved
			P23.3g	Reserved
			P23.3h	Reserved
FC–B	2	3	P23.1e	Reserved
			P23.1f	Reserved
			P23.1g	Reserved
			P23.1h	Reserved
FC–A	5	3	P.22.5e	Reserved
			P.22.5f	Reserved
			P22.5g	Reserved
			P22.5h	Reserved
FC–B	6	3	P.22.3e	Reserved
			P.22.3f	Reserved
			P22.3g	Reserved
			P22.3h	Reserved

Note: If the blade is to be adapted to specific needs, further connector pinouts may be useful to give information on which signal is assigned to which pin. Refer to AdvancedTCA specification.

Power Connector

This connector supports the functionality of the AdvancedTCA specification.

For details please refer to the PICMG 3.0 R1.0 specification.

Sensors

The IPMC functionality is based on the Intelligent Platform Management Standard V1.5a

The sensors on the ATCA −S100 are shown in the table below.

For further information refer to the *ATCA −S100: Control via IPMI Reference Guide.*

Table 11: *ATCA–S100 Specific Sensors*

Sensor Name	Type of Measurement	What Does It Measure?	Event/ Reading Type Code	Availability
Temperature HDD1	Temperature	Temperature 1	analog	Always
Temperature HDD2	Temperature	Temperature 2	analog	Always
Voltage +2.5V	Voltage	Voltage 2.5V	analog	When payload powered
Voltage +3.3V	Voltage	Voltage 3.3 V	analog	When payload powered
Voltage +5V	Voltage	Voltage 5 V	analog	When payload powered
Voltage +12V	Voltage	Voltage 12 V	analog	When payload powered
S100 HotSwap	Hot swap status	ATCA hot swap status	Sensor specific discrete	Always
IPMB0 Status	IPMB status	ATCA IPMB0	Sensor specific discrete	Always
S100 IPMC	IPMC status	Reading the status information	Sensor specific discrete	Always
Not Present HDD1	Presence	Absent HDD1	Sensor specific discrete	When payload powered
Not Present HDD2	Presence	Absent HDD2	Sensor specific discrete	When payload powered
Failure HDD1A	Failure	ErrorFailure on HDD1 Fibre Channel A	Sensor specific discrete	When payload powered ANDWhen HDD1 equipped (Ref: Not Present HDD1)
Failure HDD1B	Failure	Failure on HDD1 Fibre Channel B	Sensor specific discrete	When payload powered ANDWhen HDD1 equipped (Ref: Not Present HDD1)

Sensor Name	Type of Measurement	What Does It Measure?	Event/ Reading Type Code	Availability
Failure HDD2A	Failure	Failure on HDD2 Fibre Channel A	Sensor specific discrete	When payload powered ANDWhen HDD2 equipped (Ref: Not Present HDD2)
Failure HDD2B	Failure	Failure on HDD2 Fibre Channel B	Sensor specific discrete	When payload powered ANDWhen HDD2 equipped (Ref: Not Present HDD2)
Disabled SFP–A	Status	Enabled/Disabled SFP–A state	Sensor specific discrete	When payload powered
Disabled SFP–B	Status	Enabled/Disabled SFP–B state	Sensor specific discrete	When payload powered
S100 FC Speed*	Fiber channel signal speed	Speed of Fiber Channel	Sensor specific discrete	When payload powered
No Signal SFP–A	Fiber channel signal	No valid fiber channel signal on SFP–A	Sensor specific discrete	When payload powered ANDWhen SFP–A enabled (Ref: Disabled SFP–A)
No Signal SFP–B	Fiber channel signal	No valid fiber channel signal on SFP–B	Sensor specific discrete	When payload powered ANDWhen SFP–B enabled (Ref: Disabled SFP–B)
No Signal Ch.x	Fiber channel signal	No valid fiber channel signal on backplane fabric channel x x = 1–6	Sensor specific discrete	When payload powered ANDWhen channel x enabled by Ekeying
Speed SFP–A	Fiber channel signal speed	SFP–A fiber channel speed	Sensor specific discrete	When payload powered ANDWhen signal detected (Ref: No Signal SFP–A)
Speed SFP–B	Fiber channel signal speed	SFP–B fiber channel speed	Sensor specific discrete	When payload powered ANDWhen signal detected (Ref: No Signal SFP–B)
Speed Ch.x	Fiber channel signal speed	Fiber channel speed on backplane fabric channel x x = 1–6	Sensor specific discrete	When payload powered ANDWhen signal detected (Ref: No Signal Ch.x)

Sensor Name	Type of Measurement	What Does It Measure?	Event/ Reading Type Code	Availability
FC L.O.S. SFP–A	Loss of signal	SFP–A Loss of Signal	Sensor specific discrete	When payload powered
FC L.O.S. SFP–B	Loss of signal	SFP–B Loss of Signal	Sensor specific discrete	When payload powered
FW Revision ISC	Revision	Revision of ISC Firmware	Sensor specific discrete	Always

Index

C

Compliances 22
Connection, face plate 40
Connection fiber channel 43

E

Expansion via face plate 40

F

Face plate 45
Face plate connection 40
Face plate expansion 41
Features 21
Fiber channel connection 43

H

Hard disks 42
HDD 42

I

Installation 34
Intelligent platform management controller IPMC . 42
IPMI 42
IPM power 42

M

Management, storage blade 42

N

Nomenclature of the product 23

O

Order number 23

P

P22 connector 47
P23 connector 47
Power connector 49
Power requirements 32
Power supply 42

R

Requirements 28

S

SFP connector 46
Storage blade management 42

Z

Zone 2 connector 47